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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
KENNEDY, JENNIFER M

ART UNIT	PAPER NUMBER
2812	13

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/904,112	Applicant(s) BASCERI ET AL.	
	Examiner Jennifer M. Kennedy	Art Unit 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-72,74-76 and 80-106* is/are pending in the application.

4a) Of the above claim(s) *7,13,14,16-21 and 31-36, 51-56, 64-72, 80-99, 106* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-12,15,22-30,37-50,57-63,74-76 and 100-105* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Response to Amendment

Applicants' arguments with regard to the rejections under 35 U.S.C. 102 or 103 have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicants argue that since Kunitomo discloses that any one of ruthenium oxide, tungsten, titanium nitride and ruthenium may be formed as the lower electrode, one must be motivated to pick and choose from two different methods anticipation is negated. The examiner disagrees. A genus does not always anticipate a claim to a species within the genus. However, when the species is clearly named, the species claim is anticipated no matter how many other species are additionally named. Ex parte A, 17 USPQ2d 1716 (Bd. Pat. App. & Inter.1990)..MPEP 2131.02

Further, the applicant cites that a single reference to anticipate requires disclosure of all elements of the claimed invention arranged as in that claim. Panduit Corp. V. Dennison MFG. Co., 227 USPQ 337, 350 (Fed Cir. 1985). The examiner maintains that Kunitomo et al. does disclose all of the elements of the claimed invention as arranged as in that claim, ie. a ruthenium oxide lower electrode is disclosed (see column 18, lines 13-17). Finally, in view of the reference being anticipatory the examiner does not need to provide motivation.

Applicants also argue that the protect layer 53 prevents oxygen from entering "during heat treatment in an oxidation atmosphere" citing column 18, lines 22-27. Again, the examiner notes that the product layer is formed on the conductive plugs and functions to prevent oxidation of the layers below the plug, not the lower electrode. The

examiner notes that the protect layer is formed over the plugs, not the lower electrode, leaving the lower electrode exposed to oxidation processes (see Figure 21). Further the statement that "since the reaction protect layer 53 is formed of ruthenium oxide film as described before, oxygen does not pass through the tantalum oxide film **or the lower electrode 54** to reach the plugs 49..." also points to the plugs being protected from oxidation, not the lower electrode (emphasis added by applicants).

Furthermore, the above quoted section with the bold emphasis was used by the applicants to support their opinion that the lower electrode was not oxidized. The examiner notes a discrepancy in applicants argument. The quoted section states that oxygen does not pass through the **tantalum oxide layer** or the lower electrode. It is clear throughout the disclosure that tantalum oxide is oxidized. However applicants maintain that this passage means that the lower electrode is not oxidized.

Finally, the examiner notes that the protect layer can be omitted as disclosed in column 18, line 10-13.

The amended claim language of "the conductive oxide is provided with enough oxygen so as to be stable with the oxide dielectric layer" is accomplished by an oxidation step as explained in the specification page 7, lines 20-30. Once again the examiner maintains that the lower electrode is oxidized and therefore, the limitation the conductive oxide is provided with enough oxygen so as to be stable with the oxide dielectric layer is met.

The examiner notes that Kunitomo does discuss alternatives that prevent the lower electrode from being oxidized in the heat treatment and oxidation of the tantalum

oxide layer as pointed out by applicants in Column 19, lines 15-27. However, the examiner notes that in stating these alternatives, Kunitomo teaches that the lower electrodes are oxidized in the previous described methods. For instance, Kunitomo teaches that the tantalum oxide film, and consequently the lower electrode is subjected to a heat treatment at a temperature of 650°C or more in an oxidation atmosphere, having a first condition or a second condition (see column 18, lines 46-62). Further Kunitomo teaches that in "the case where the oxidation of the lower electrodes 54 is a matter" a two step treatment for the crystallization can be done and lists the conditions one could accomplish this (see column 19, lines 15-27).

Finally the examiner notes that Kunimoto teaches that the lower electrodes of ruthenium oxide can be formed by a sputtering method or a CVD method and further have been oxidized when performing the crystallization process of the tantalum oxide film (column 21, lines 15-34).

Teaching another way is a broad concept. It refers to a situation where a reference teaches a preferred, a better, or an alternative way to a claimed way of accomplishing something. A reference must be considered for all it teaches. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F .2d 281, 296, 227 USPQ 657, 666 (Fed. Cir. 1985). Preferred embodiments and disclosed examples do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *Merck & Co. v. Biocraft Labs.*, 874 F2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989); *In re Mills*, 470 F .2d 649, 650, 176 USPQ 196, 198 (CCPA 1972). Similarly, a statement that a first product is somewhat inferior to another product for the same use does not teach

away when the reference also discloses that the first offers acceptable advantages. *In re Gurley*, 27 F. 3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).

Applicants also argue that while they recognize that Kunitomoto al. to teach forming a ruthenium upper electrode layer, and Joo to teach a ruthenium oxide layer formed by a gas plasma technique, they do not agree with the examiners motivation to combine. The examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why ones skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971). Since plasma methods are commonly done at lower temperatures than thermal oxidation methods one of ordinary skill in the art would perform a plasma method rather than a thermal method with a high temperature so that the thermal budget may be lowered.

Finally, applicants also argue that Kingon et al. does not provide a motivation for forming a gas permeable (Pt) electrode on an upper electrode. The examiner points the applicants to the abstract of Kingon et al., which states that the hybrid electrode structures of ruthenium oxide and platinum improve capacitor performance both in terms of fatigue and leakage current.

Applicants are referred to the rejection given below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-6, 15, 22-30, 37-42, 45-49, 74-76, and 100-105 are rejected under 35 U.S.C. 102(e) as being anticipated by Kunitomo et al. (U.S. Patent No. 6,235,572).

Kunitomo et al. discloses the method of forming a capacitor comprising providing a conductive oxide electrode (RuO_x) (51), depositing a first layer of a high dielectric constant oxide dielectric material (55) on the conductive oxide electrode, oxidizing the conductive oxide electrode and the first layer of the high dielectric constant oxide dielectric material (Ta_2O_5) under oxidizing conditions (see column 18, line 45 through column 19, line 45) such that at least the surface area of the conductive oxide electrode is provided with enough oxygen to provide stability wit the first layer of high dielectric constant oxide material, depositing a second layer of the high dielectric constant oxide dielectric material (Ta_2O_5) on the first layer of the high dielectric constant oxide dielectric material, oxidizing the second layer of high dielectric constant oxide dielectric material (see column 19, lines 46-58), and then depositing an upper layer electrode (RuO_x) (62) on the second layer of the high dielectric constant oxide dielectric material.

Kunitomo et al. further discloses the method wherein the first high dielectric constant oxide dielectric material is oxidized using a gas plasma (see column 2, lines18-21), and the gas selected from the group consisting of O_2 and O_3, at a temperature from a range of about 250 °C to about 500 °C (see column 18, line 45 through column 19, line 45).

Kunitomo et al. also discloses the method wherein the second layer of high dielectric constant oxide dielectric material is oxidized by rapid thermal oxidation, at a temperature of less than about 700 °C in the presence of a gas selected from the group consisting of O_2 and N_2O conditions (see column 18, line 45 through column 19, line 45).

Kunitomo et al. also discloses the method wherein a field effect transistor (13, 14, 15) having a pair of source/drain regions (22, 23) is provided, electrically connecting one the source drain region with the conductive oxide electrode and the other of said source drain regions with a bit line (BL) (see Figure 35).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-12, 43-44, 50, and 57-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunitomo et al. (U.S. Patent No. 6,235,572) in view of Joo (U.S. Patent No. 5,879,957).

Kunitomo et al. discloses the method substantially as claimed, and rejected above, but does not disclose the method of oxidizing the upper layer electrode utilizing gas plasma and a temperature range from about 250 to 500 °C. Joo discloses the method of oxidizing an electrode utilizing gas plasma (see column 4, lines 46-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to oxidize the upper electrode by a gas plasma technique as disclosed in Joo in order to avoid a heat treatment at a high temperature.

The selection of the range of temperature is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious).

Claims 11-12 and 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunitomo et al. (U.S. Patent No. 6,235,572) and Joo (U.S. Patent No. 5,879,957), in view of Kingon et al. (U.S. Patent No. 5,555,486).

Kunitomo et al. and Joo et al. disclose the method substantially as claimed and rejected above, but do not disclose the method of forming a platinum electrode on the upper layer electrode. Kingon et al. discloses the method of forming a platinum

electrode upon an upper electrode (see column 6, lines 38-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a platinum electrode upon an upper electrode in order to reduce leakage current.

While, Kingon et al. does not disclose first forming the gas permeable electrode and then performing the oxidizing step so that the oxidation occurs through said gas permeable electrode the examiner notes that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the gas permeable electrode and then oxidize the upper electrode.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (703) 308-6171. The examiner can normally be reached on Mon.-Fri. 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

jmk
May 7, 2003

John F. Niebling
Supervisory Patent Examiner
Technology Center 2800